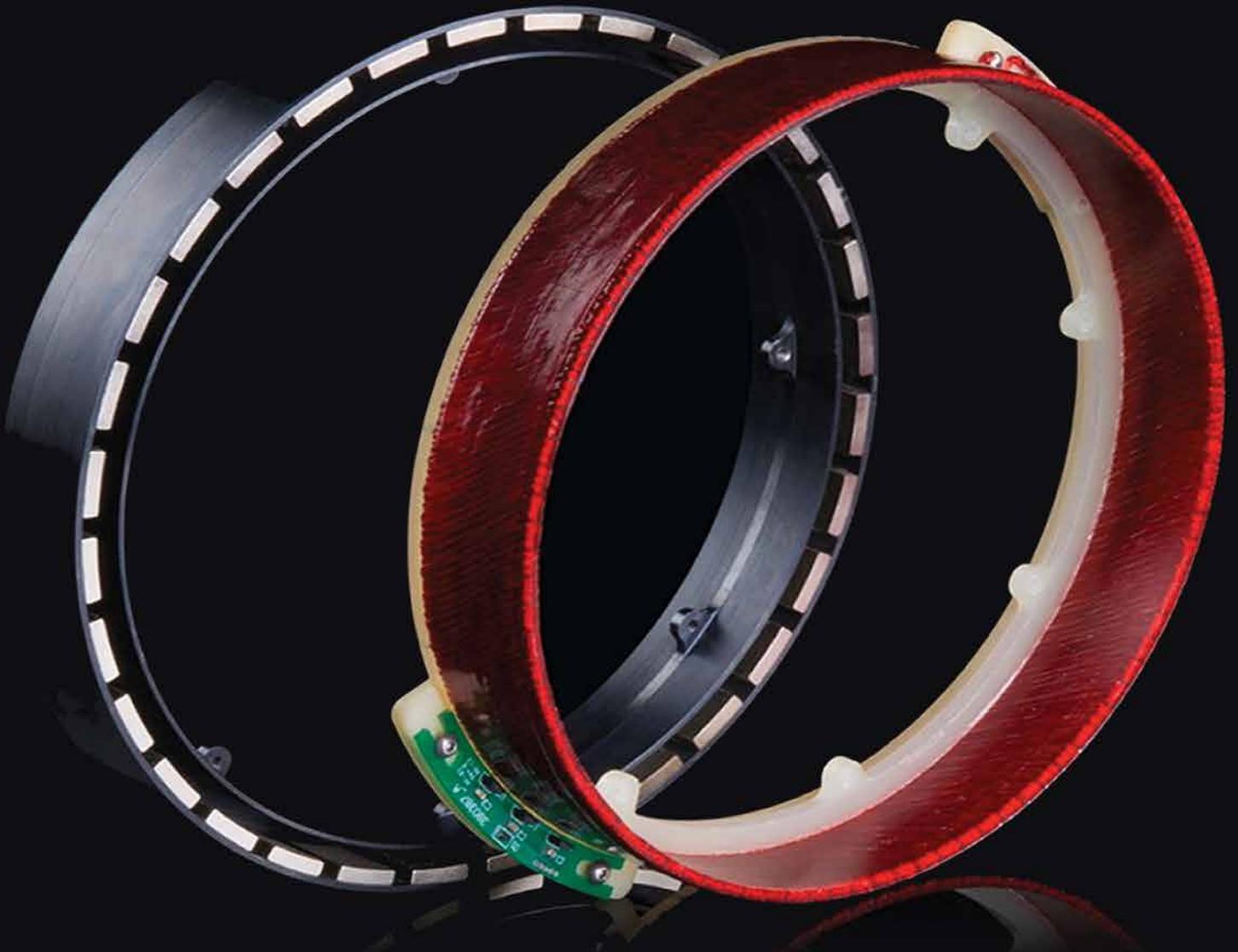




INNOVATION IN MOTORS



Direct Mounting - Zero Cogging - Industry Leading Power Density



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Version 5.0



ThinGap was founded in 2001 to focus on solving the most difficult motor design challenges as a research and development organization. We gained a reputation as specialist in design of high power density motors specifically configured to meet stringent space and weight requirements. Our portfolio includes over 100 custom motor designs for the most challenging applications.

In 2012 ThinGap expanded to incorporate our proprietary technology and engineering expertise into commercial markets and became more product focused. We secured investment capital to grow our engineering capability and have established a network of international manufacturing facilities to better serve our customers. ThinGap has over 160,000 motors in operation today.

Please browse our catalog and talk to our engineers if you cannot find a motor in our product line that can meet your specific needs.



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Motor Operation and Unique Advantages

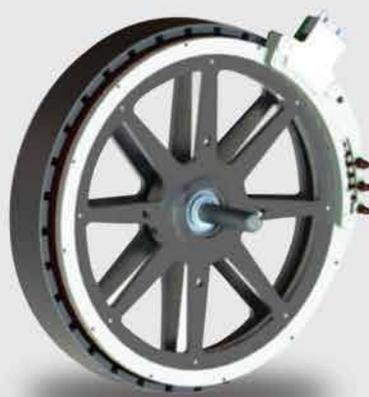
ThinGap offers high efficiency motors and generators with previously unattainable power density. They directly integrate with your system to save space, weight and parts count.

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- ▶ Industry leading power-to-weight and torque-to-weight ratios
- ▶ High system efficiency
- ▶ Excellent velocity smoothness with zero cogging torque
- ▶ Quiet operation
- ▶ Frameless motors enable direct integration saving space and system components
- ▶ Brushless DC or Synchronous AC operation



TG7140 Frameless
Stator-Rotor Part Set



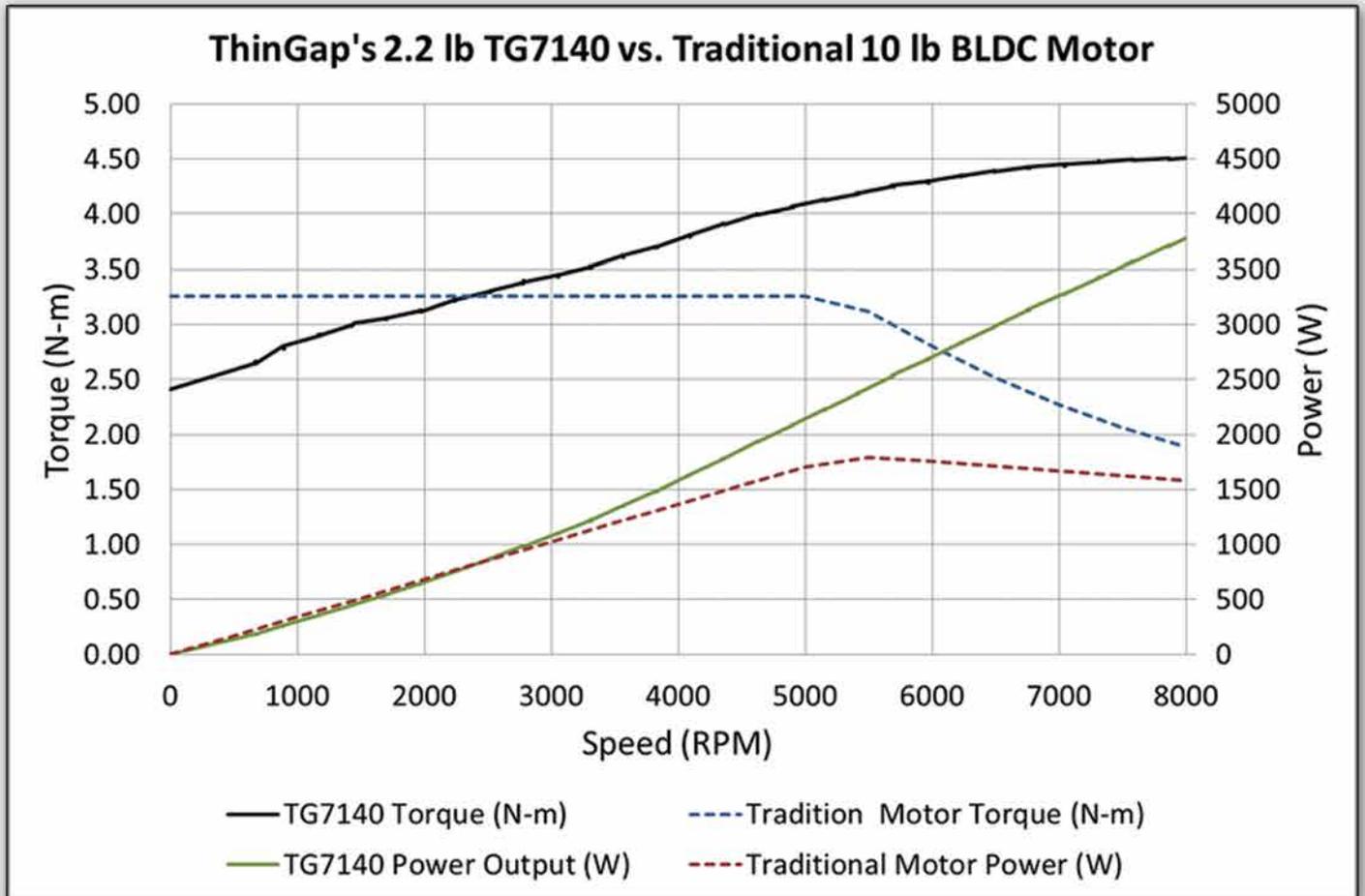
TG7140 Motor
with Mount



TG7140 Motor Integrated
with Pump System

Performance Relative to Conventional Motors

ThinGap's ironless motors do not saturate with increasing current or speed. Torque versus current is linear and torque capacity increases with speed given an appropriate cooling path. The result is high torque capacity across a wide speed control range.





Applications and Features

EXAMPLE MOTOR AND GENERATOR APPLICATIONS	KEY PRODUCT FEATURES AND BENEFITS
Portable Compressors and Hydraulic Pumps, Automotive Cooling Pumps	Lightweight, high efficiency, pumping smoothness, direct motor mounting with pump components, quiet operation, air cooled
Camera Lens Control and Optical Scanning Systems	Lens integration into center of motor, lightweight, high accuracy position control, direct mounting, quiet
Unmanned Aerial Vehicle (UAV) Engine Starter-Generator	Frameless motor integrates directly with engine to save weight and reduce parts, high efficiency power generation, lightweight robust construction, high torque starter motor
Space Satellite Reaction Wheel	Motor design architecture facilitates novel reaction wheel design, standard product tailored to required voltage, lightweight
Electric Aircraft Propulsion	High power and torque to weight, ring motor facilitates novel motor – fan system design, high efficiency, quiet operation
Powered Medical Beds and Wheelchairs	High torque to weight and torque to volume, ring motor directly integrates with wheel assembly, high efficiency, quiet operation
Robotic Arm Actuator	High torque to weight and torque to volume, ring motor integrates with robotic arm gear assembly, high efficiency, quiet operation



TG7140 7" Rotor & Stator



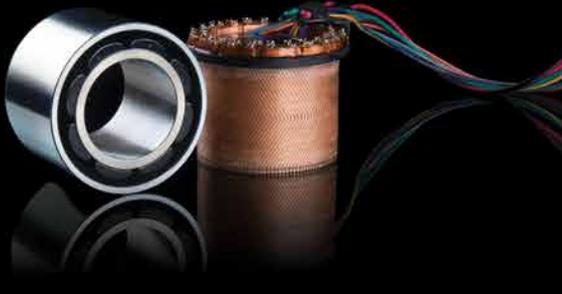
TG13360 13" Rotor & Stator



TG23XX Series Motors

Model	TG2310	TG2311	TG2320	TG2321	TG2330	TG2331	TG2340	TG2341
Continuous Max Voltage (VDC)	56	37.5	72	48	110	72	72	48
Continuous Max Power (W)	550	530	560	530	1000	980	800	760
Continuous Max Power (HP)	0.74	0.71	0.75	0.71	1.34	1.31	1.07	1.02
Max Continuous Speed (RPM)	7500	7500	15000	15000	15000	15000	7500	7500
Max Continuous Torque (N-m)	0.7	0.68	0.35	0.35	0.64	0.61	1.02	0.9
Max Continuous Current (ADC)	12.8	20.4	11.4	17.6	13.3	20.6	13.2	21.0
Rotor O.D. (in)	2.24	2.24	2.38	2.38	2.64	2.64	2.64	2.64
Rotor I.D. (in)	1.31	1.31	1.70	1.70	1.62	1.62	1.62	1.62
Axial Length (in)	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
Frameless Motor Weight (lb)	0.96	0.96	0.64	0.64	1.21	1.21	1.34	1.34
Motor Mount Weight (lb)	0.23	0.23	0.26	0.26	0.26	0.26	0.30	0.30
Torque Constant Kt (N-m/ADC)	0.061	0.035	0.032	0.020	0.064	0.037	0.077	0.047
Voltage Constant Ke (RPM/V Peak L-L)	165	301	261	458	142	248	127	201

TG23XX Series Part Sets



TG2310/TG2311



TG2320/TG2321



TG2330/TG2331

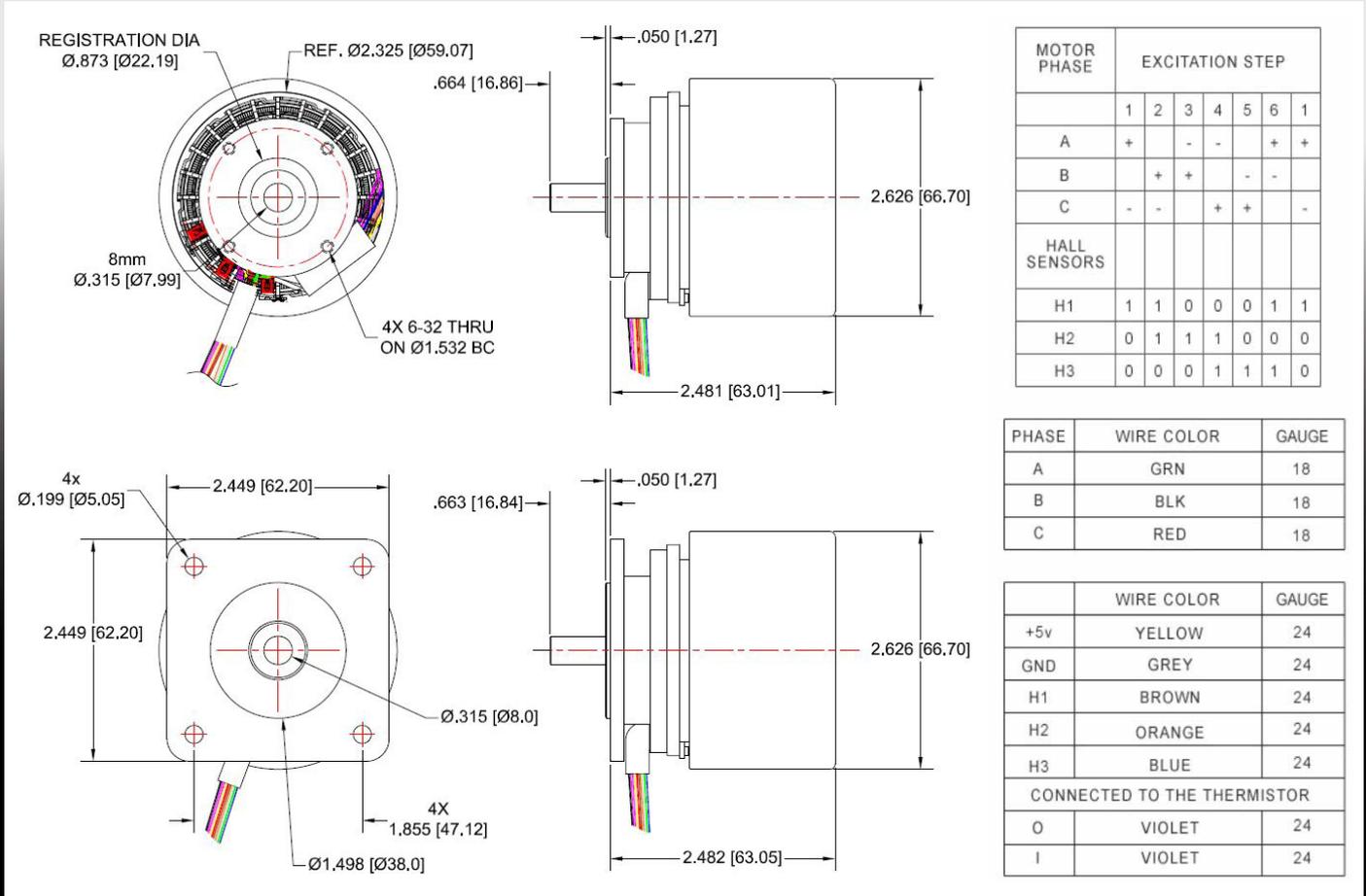


TG2340/TG2341



Mounting Options: TG23XX Motors

ThinGap's mounts can be customized to meet your needs. Shown below are standard mounts ThinGap offers.



TG23XX Motors Shown with M1 and M2 Mounting Options



Off-The-Shelf Motors Continued

TG2950 MOTOR

Continuous Max Voltage (VDC)	63.6
Continuous Max Power (W)	128
Max Continuous Speed (RPM)	6,500
Max Continuous Torque (N-m)	0.19
Max Continuous Current (Arms)	3.97
Rotor O.D. (in)	2.95
Rotor I.D. (in)	2.40
Axial Length (in)	0.79
Frameless Motor Weight (lb)	0.22
Torque Constant Kt (N-m/Arms)	0.064
Voltage Constant Ke (RPM/V Peak L-L)	175.2



TG3760 MOTOR

Continuous Max Voltage (VDC)	92
Continuous Max Power (W)	560
Max Continuous Speed (RPM)	5,000
Max Continuous Torque (N-m)	1.07
Max Continuous Current (Arms)	6.1
Rotor O.D. (in)	3.76
Rotor I.D. (in)	2.89
Axial Length (in)	1.13
Frameless Motor Weight (lb)	0.90
Torque Constant Kt (N-m/Arms)	0.176
Voltage Constant Ke (RPM/V Peak L-L)	54.34



TG7140 MOTOR (Part-Set also shown on front cover)

Continuous Max Voltage (VDC)	160
Continuous Max Power (W)	3,850
Max Continuous Speed (RPM)	8,141
Max Continuous Torque (N-m)	4.52
Max Continuous Current (Arms)	28.0
Rotor O.D. (in)	7.16
Rotor I.D. (in)	6.33
Axial Length (in)	1.72
Frameless Motor Weight (lb)	1.88
Motor Mount Weight (lb)	0.70
Torque Constant Kt (N-m/Arms)	0.21
Voltage Constant Ke (RPM/V Peak L-L)	52.18





Upcoming 2015 Motors

MODEL	TG16XX	TG5XXX	TG9XXX	TG13360
Rotor O.D. (in.)	1.6	5.0	9.0	13.3
Axial Length (in.)	1.0	1.5	1.8	5.5
Continuos Power Output (kW)	0.1	3	7	20
Speed (RPM)	8000	8000	8000	6000

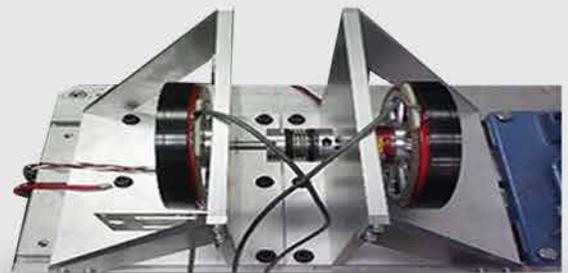
CUSTOM MOTOR SOLUTIONS

ThinGap offers custom motor and generator development. Our capabilities cover a wide range of specifications and markets. New motors are available in as little as 12 weeks. Existing ThinGap products can be modified in 4-8 weeks.

PARAMETER	SPECIFICATION RANGE
Rotor O.D. (in.)	0.75 to 44
Rotor I.D. (in.)	0.4 to 42
Axial Length (in.)	0.75 to 16
Power Output (kW)	0.01 to 500
Speed (RPM)	0 to 20,000
Torque (Nm)	0.01 to 500
Voltage (V)	0 to 800

ENGINEERING SERVICES OFFERED

- Electromechanical Machine Design and Systems Engineering
- Motor and Generator Testing, Data Acquisition, and Characterization
- Motor Controller Evaluation & Analysis



Tandem Motor Generator Testing



Markets Served



**MEDICAL DEVICES
AND TECHNOLOGY**



**AEROSPACE AND
DEFENSE**



UNMANNED SYSTEMS



INDUSTRIAL SYSTEMS



**ROBOTICS AND
INDUSTRIAL AUTOMATION**



INNOVATION IN MOTORS



TG13360 13" Rotor & Stator

www.ThinGap.com



INNOVATION IN MOTORS



**DIRECT MOUNTING
SAVE SPACE
REDUCE COMPONENTS**

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